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ABSTRACT

This paper examines eight studies that utilized film or videotape to enhance motor performance through modeling or self-examination of performance. The studies, dating as far back as 1944, dealt with learning bowling, golf, basketball, throwing, gymnastics, racquetball, and other motor tasks. For each study, the paper outlines the problem, the purpose, the method, the results, and interpretation of the results. (Contains 14 references.) (JDD)

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Review of Literature: Utilizing film/videotape through modeling or self examination of performance to enhance performance.

by

Brett D. Mills

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This paper examines studies utilizing film/videotape through modeling or self examination of performance to enhance performance.

Lockhart (1944): The Value of the Motion Picture as an Instructional Device in Learning A Motor Skill.

Problem: This study tried to determine the value of the motion picture as an aid to learning in an instructional situation in the field of physical education.

Purpose: To determine the value of the motion picture as an instructional device in learning the motor skill of bowling.

The experimental and control groups were composed of female college freshman who were required to take physical education. Each of the subjects freely chose bowling to fulfill their physical education requirement, and had no previous learning experience aided through the use of motion picture. Two instructors who had previous experience in the use of instructional film each taught two control and two experimental classes.

The experimental group was given instructional aid based on their performance shown on film. The instructor would point out key points on the film where performance could be improved. The control group received instructional aid, (i.e., verbal, instructor demonstration, corrective feedback, etc.) but received no instructional aid through the use of motion picture film.

Records were kept over a seven week period recording: (a) each ball rolled by each student during every class period; (b) the scores made per day as obtained by the usual method of scoring bowling; (c) dates on which film instruction were given.

The results showed that the experimental and control groups had an equal linear increase in performance for the first two weeks. After two weeks the experimental group had a negatively accelerating performance curve for the following five weeks. The control group had an overall increase in performance over the seven week period, but the performance curve would be similar to an S-curve. The experimental group had a better overall performance gain than the control group.

According to Lockhart (1944): "In any learning problem it is necessary to obtain an intellectual concept, a clear picture of just what is expected." The results of this study seem to suggest film may have assisted in giving the experimental group the "intellectual concept" to grasp the

nature of the desired response. The experimental group having a better overall performance may be due to the control group having a more difficult time formulating the "intellectual concept" to determine the nature of the desired response.

The major conclusions found by Lockhart (1944) were:

(a) The rate of improvement in learning of the experimental group was more consistent than that of the control group.

(b) During the first two weeks of instruction the performance in the two groups was practically identical. As shown by the critical ratios and slope of the curve during the third week, the experimental group continued its initial rapid rate of improvement whereas the control group remained at practically a standstill. A similar plateau of learning was shown by the control group in the fifth week while again the experimental group maintained its steady improvement.

(c) There is strong evidence, as shown in the critical ratios of the fifth week, that the experimental group at this time was definitely superior to the control.

(d) Although the experimental and control classes started with practically the same mean score, at the end of the third week of instruction the experimental classes surpassed the control group and continued to be superior throughout the remaining periods of observation.

Lockhart (1944) stated in the Interpretation of Results section of his study that: "In answer to the question of where in the learning process the motion picture should be introduced, the general conclusions from other fields of learning indicate that it is of most value during the early stages of learning, decreasing in value as skill increases." Using motion picture in the early stages of learning can be useful in developing the "intellectual concept", but using film as an instructional aid in the early stages of learning

could hinder performance. Most unskilled performers have not developed an adequate repertoire for interpreting informational ques given by an instructor about their performance on film. If using film as an instructional aid for unskilled performers it must be used only for the development of the "intellectual concept".

Nelson (1958): Effect of Slow-Motion Loopfilms on the Learning of Golf.

Problem: Can slow-motion loopfilms assist in learning a complex gross motor skill?

Purpose: The purposes of this investigation were: (a) To adapt, in a general way, the use of motion pictures to the teaching of golf at the time and place of learning, and (b) To study the effect on learning golf when slow motion loopfilms were employed.

The subjects were 47 adult men and women who had never swung a golf club. There was an experimental and control group. The experiment covered 15 days, every Monday, Wednesday, and Friday over a five week period. Each subject hit 30 golf balls with a seven iron from the same location each day. The experimental and control groups received

verbal explanation, a brief demonstration of the skill, and the experimental group also received instruction from slow-motion loopfilms whereas the control group did not. There were five different scoring techniques: (a) the use of final day scores; (b) the difference between the first and final day scores; (c) the sum of all scores; (d) per cent-of-possible gain method; (e) comparing scores in groups of five--total of first five scores, second five scores, and third five scores.

Nelson (1958) found that the control group was superior to the experimental group except on the second, 12th, and 15th days. Overall the control group recorded slightly higher scores than the experimental group. The rate of learning was fairly uniform for both groups. The results from this study contradict previous findings (Ruffa, 1931; Priebe & Burton, 1939; Lockhart, 1944).

The major conclusions from this study were:

(a) Both groups made gains in learning as evidenced by the scoring techniques.

(b) The variability of both groups decreased significantly with practice.

(c) Both groups became more homogeneous with practice, but not significantly different from each other.

(d) Most of the movements found in activities are performed so fast the naked eye cannot follow them and technical aspects are difficult to teach. Consequently, motion pictures appear to help the instructor point out the intricacies of complex gross motor movements.

(e) Slow-motion loopfilms seem to favor the learning of golf, in the later stages of learning, but not in the early stages. Differences were not found to be significant. Certainly the possibilities for gains should not be ignored.

Because the subjects in this study were beginners the use of slow-motion loopfilms does not contribute a great deal to the learning of the complex gross motor skill of golf. As noted before most unskilled performers have not developed an adequate repertoire for interpreting informational ques given by an instructor about their performance on slow-motion loopfilms.

Martens, Burwitz, and Zuckerman (1976): Modeling Effects on Motor Performance.

Problem: Previous research has given no consideration to whether the observer can discriminate between the relevant and irrelevant cues presented in a rapidly performed series of complex actions, or whether he has the motor capability to perform the modeled behavior, or indeed whether he has the inclination to imitate the model.

Purpose: The purpose of these series of experiments was to determine the function of demonstration on performance during the initial acquisition period for two different motor skills.

Each of the three experiments examined the influence of observing a correct model, a learning sequence model, and an incorrect model. The subjects and apparatus used for each experiment are as follows:

Experiment 1: Subjects - 60 boys from the 2nd and 3rd grades, and 60 boys from the 7th and 8th grades. Apparatus - the motor task was known as a "roll up", the objective was to roll a small black ball up an inclined board to a target area.

Experiment 2: Subjects - 40 boys from the 8th grade. Apparatus - the motor task "roll up".

Experiment 3: Subjects - 48 college males. Apparatus - "Shoot-the-moon". The task involves manipulating two inclined rods in such a way as to cause a steel ball to roll up the incline and hit a designated target.

In each of the three experiments each subject viewed a correct model, a learning sequence model, or an incorrect model on film. All three experiments clearly demonstrated that viewing a filmed model effected the motor performance of the observers.

In a fourth experiment Martens et al. (1976) examined whether a filmed model would have the same effect on performance as a live model. Martens et al. (1976) concluded that observing a live model or a filmed model had no differentiating affect on the performance of the observer.

Hall and Erffmeyer (1983): The Effect of Visuo-Motor Behavior Rehearsal with Videotaped Modeling on Free Throw Accuracy of Intercollegiate Female Basketball Players.

Problem: Will the effect of visuo-motor behavior rehearsal with videotaped modeling effect free throw accuracy?

Purpose: To determine the effect of visuo-motor behavior rehearsal with videotaped modeling on free throw accuracy of intercollegiate female basketball players.

There were 10 highly skilled intercollegiate female basketball players used for this study. Five subjects were randomly assigned to the VMBR group (videotaped modeling), and five subjects randomly assigned to the relaxation group (no modeling). The VMBR group received progressive relaxation training, visual imagery training, and videotaped modeling. The relaxation group received progressive relaxation and visual imagery training. The task performed was free throws.

The VMBR group had a linear increase in their performance while the relaxation group saw no increase in performance. There were three major conclusions from this study: (a) Results from the present study support the efficacy of VMBR modeling in improving foul shooting accuracy of highly skilled basketball players. (b) Most

forms of mental rehearsal are more effective for experienced/highly skilled performers. (c) Mental rehearsal of kinesthetic sensations specific to a sport keeps rehearsal in the first-person perspective and facilitates auditory and/or olfactory sensations.

Hall and Erffmeyer (1983) concluded that video modeling is best used with highly skilled performers who have developed an adequate repertoire for interpreting informational ques given by an instructor about their performance on video tape.

McCullagh (1986): Model Status as a Determinant of Observational Learning and Performance.

Problem: Is the model status a determining variable in observational learning and performance?

Purpose: The primary purpose of this experiment was to determine if model characteristics influence observer performance by exerting their prime influence on the attentional phase of observational learning as predicted by Bandura (1969). A second purpose was to determine whether model characteristics affected actual amount learned or whether merely performance levels were affected by this manipulation.

There were 72 female volunteer subjects involved, and each of the subjects was assigned to observe one of the four modeling conditions: (a) Model performs stunt in uniform; (b) Still-slide of model with verbal introduction; (c) Task instructions only from model; (d) Filmed task demonstration of model. The task being modeled was the "Bachman Ladder" (Bachman,1961). Each of the subjects would view a high status model (cheerleader), and a low status model (lady in old ragged cloths) at different levels depending on the trial conditions. Once each of the subjects had seen one of the four modeling conditions the subjects were introduced to the "Bachman Ladder" (Bachman, 1961) then performed the task. The study was performed in two phases.

In phase I subjects viewing a high status model scored significantly higher than the subjects viewing a low status model. The four model conditions had no significant difference. In phase II there was no difference between the high status model group and the low status model group. The four model conditions had no significant difference.

The following conclusions were made from this study: (a) The use of live models that have more realistic, and longer lasting relationships with the subjects involved will not only affect the attentional focus of the subject but will lead to a higher degree of observational learning. (b) Live and realistic models may have a more dramatic effect on subjects' behavior than filmed models. The before mentioned

conclusions have no significant statistical base, and therefore must be considered only speculative on the part of the researcher.

The use of modeling through film is somewhat limited depending on the status of the model. If the live model was of low status, and the filmed model was of high status then you would most likely find the high status filmed model group to perform significantly higher than the low status live model group. If film is to be used when presenting a model you must present a model of high status to the subjects.

Williams (1989a): Throwing Action from Full-Cue and Motion-Only Video-Models of an Arm Movement Sequence.

Problem: Will videotaped demonstrations of arm movement give enough relative information for modeling a given pattern of movement?

Purpose: The purpose of this study was to determine whether videotaped demonstrations of an action which displayed only the motion pattern of a model's limb as compared with one which showed both form and motion provide sufficient information for modelling a given pattern of movement.

There was twelve men and twelve women assigned to three groups (4 men and 4 women in each). Each subject viewed a six second videotape demonstration six times of an arm movement sequence/throwing action. Group 1 viewed the whole arm in dark clothing against a light colored background, group 2 viewed the arm as the relative motion of patches of light situated at the shoulder, elbow, and wrist joints, and group 3 viewed the arm as the relative motion of the upper and lower segments of the arm represented by strips of light-reflectant material. After viewing the videotape each subject performed the throwing action demonstrated by the model and the results were recorded with a polarized-light goniometer.

The results were examined under the following three conditions: (a) The number of trials taken to produce the demonstrated pattern of the eight movements leading up to the throwing action, that is, the sequence of flexion and extension at the elbow as shown by the model; (b) Number of degrees of displacement of elbow flexion prior to the throwing action relative to the model; (c) The ratio of time taken to flex the elbow and number of degrees displacement of the elbow prior to the throwing action relative to the model.

The results found from this study was: it made little or no difference if the form of the arm was available. Even if the form was abstracted from the demonstration the

observer was still able to initiate the correct form. All the demonstrations provided adequate information for the production of limb displacement similar to that portrayed by the model.

When teaching a motor task in which the correct order of movements and spatially arranging the limb segments is essential it is not necessary to show the form pattern and the motion pattern without abstraction. Abstraction of the form pattern and the motion pattern did not seriously impair the usefulness of the model in this study. If timing criterion is essential for the motor task to be performed efficiently then the motion and form must be fully demonstrated by the model.

Williams (1989b): Effects of Kinematically Enhanced Video-Modeling on Improvement of Form in a Gymnastic Skill.

Problem: Will the effects of kinematically enhanced video-modeling improve the form in a gymnastic skill?

Purpose: By applying research findings on the perception of human movement it was predicted that enhancement of a model's limbs (with points of light so as to convey particular postures clearly) would significantly facilitate the fidelity of modeling a gymnastic action.

Four boys aged 14 years old who could successfully execute a headspring vault without support, but who had flexed knees, were the subjects for this study. When executing the headspring vault the legs should be straight not flexed. The subjects were assigned to two groups: (a) videotaped demonstration of a properly executed headspring vault; (b) video demonstration of a properly executed headspring vault enhanced by attaching retro-reflectant discs to the model's hip, knee, ankle, shoulder, elbow, and wrist.

Each subject practiced a total of four blocks of five practice trials on two successive days after viewing the normal videotape or enhanced videotape. The subjects were recorded on the initial trial, every fifth trial, and the retention trial, and results were computed using a microcomputer-based digitizing technique. The subjects improved from 2.14 rad. to 2.59 rad. in the normal videotape condition, and from 2.09 rad. to 2.50 rad. in the enhanced videotape condition. Although the kinematically enhanced videotape condition provides a clearer demonstration for proper form it was not significantly more effective than the normal videotape condition.

It was concluded that when teaching a developing gymnast it is not necessary to provide the performer with kinematically enhanced videotape demonstrations. Videotape demonstrations will enhance performance because they allow

the observer to view proper form, but kinematically enhanced videotape demonstrations would most likely be more useful with a more advanced gymnast. A developing gymnast has not reached a high enough skill level to put kinematic information to effective use.

Gray (1990): Effect of Visuomotor Rehearsal with Videotaped Modeling on Racquetball Performance of Beginning Players.

Problem: Will visuomotor behavior rehearsal (VMBR) with videotaped modeling effect the performance of beginning racquetball players?

Purpose: This investigation was designed to assess the effect of visuomotor behavior rehearsal (VMBR) with videotaped modeling on racquetball performance of beginning players.

Twenty four men enrolled in a beginning racquetball course at the University of California, Sacramento were used for this study. Twelve subjects were randomly assigned to a behavior rehearsal with videotape-modeling condition (Group 1), and 12 subjects were randomly assigned to a progressive relaxation and visual-imagery condition (Group 2). None of the subjects had prior VMBR experience. Group 1 received

VMBR and videotape modeling training, and group 2 received progressive relaxation and visual-imagery training throughout the two week period.

Performance was measured on the fourth day of class, and at the conclusion of the two week testing period. On both testing days the subjects performed 10 forehand and 10 backhand shots, and the criterion for performance level was measured using the Reznick Shot Placement Front Wall Test modified by Epperson (1977).

When considering the forehand and backhand mean scores combined, there was no significant difference between group 1 (M=41.4, SD=13.8) and group 2 (M=42.6, SD=13.5). When considering forehand scores, group 1 had a significant difference in performance scores over group 2. Backhand performance scores saw no significant difference.

Even though performance gains were small this study adds support to previous studies (Hall & Erffmeyer, 1983; Gray & Fernandez, [in press]). Just as Hall and Erffmeyer (1983) concluded video modeling is best used with highly skilled performers who have developed an adequate repertoire for interpreting informational ques given by an instructor about their performance on video tape.

The overall conclusion from these studies is videotape is most effective with highly skilled performers. Using videotape with beginning or developing performers is only minimally beneficial.

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